

## REMARKS

In accordance with the foregoing, claims 18, 20, 22, and 25 are amended. No new matter is added. Claims 1, 3-18, 20, 22, and 25 are pending and under consideration.

### **CLAIM REJECTIONS UNDER 35 U.S.C. § 112:**

Claims 18, 20, and 22 are rejected under 35 U.S.C. 112, first paragraph, relative to the phrase "a band narrower than spectrum width obtained based on a bit rate and a type of coding of each of said optical signals." Claims 18, 20, and 22 are amended herewith in order to overcome these rejections. Support for these claims as amended can be found in the specification at pages 9-10 and 16.

Claim 25 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Claim 25 is amended herewith in order to overcome the rejection.

Claim 22 is rejected under 35 U.S.C. 112, second paragraph. Claim 22 has been corrected to clarify the claimed subject matter.

### **CLAIM REJECTIONS UNDER 35 U.S.C. § 103:**

Claims 1 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over S. Bigo et al.'s "Improving Spectral Efficiency by Ultra-Narrow Optical Filtering to Achieve Multi-Terabit/s Capacities", OFC 2002, 17-22 March 2002" (hereinafter "Bigo") in view of U.S. Patent No. 6,865,348 B2 to Miyamoto et al. ("Miyamoto").

Claim 1 is directed to a wavelength division multiplexing optical transmission system, in which each signal light with different wavelengths output from a plurality of optical senders is multiplexed by an optical multiplexer to be transmitted to an optical transmission path, and wavelength division multiplexing signal light propagated through the optical transmission path is demultiplexed depending on respective wavelengths by an optical demultiplexer to be received by a plurality of optical receivers. According to claim 1, the type of modulation of said signal light is determined to be an NRZ modulation type. Further, assuming "that the equation model expressing the transmission characteristics of said optical multiplexer and said optical demultiplexer is expressed by the following equation in which the shape of each transmission band  $T(f)$  corresponding to the wavelength of each signal light is expressed by using a frequency  $f$ , the center frequency  $f_c$  of the transmission band, full width at half maximum  $\Delta f$  of the transmission band, and a filter order " $n$ "

$$T(f) = 10 \cdot \log \left[ \exp \left\{ -2 \cdot \ln \sqrt{2} \cdot \left( \frac{|f - f_c|}{\Delta f/2} \right)^{2n} \right\} \right] \quad (\text{dB}),$$

each of said plurality of optical senders generates signal light, in which a bit rate and frequency spacing thereof are set so as to approach spectrum efficiency at which the product of a transmission distance and a transmission capacity becomes a maximum value. The optical multiplexer and the optical demultiplexer have “transmission characteristics in which transmission bandwidth is set in accordance with said equation model, and also according to the spectrum efficiency at which the product of the transmission distance and the transmission capacity becomes a maximum value.”

The Office Action relies on Bigo, a newly cited reference, to disclose most of the features of independent claims 1 and 17. Applicants respectfully submit that Bigo is not an enabling reference, because it does not disclose a system as recited in claim 1 or even assert practical implementation of such a system. Bigo merely speculates and simulates that using “ultra-narrow optical filters” the spectral efficiency is increased with respect to that of the state of the art equipment (See Bigo, Introduction section).

Bigo does not teach or disclose at least that “each of said plurality of optical senders generates signal light in which a bit rate and frequency spacing thereof are set so as to approach spectrum efficiency at which the product of a transmission distance and a transmission capacity becomes a maximum value, said product being calculated based on the assumed equation model” as recited in claim 1.

Miyamoto does not correct or compensate the above-identified failure of Bigo in teaching or suggesting all the features of claim 1. Therefore, claim 1 is patentable.

Additionally, the Office Action fails to provide a motivation to combine the teaching in the cited references. Regarding the combination of Bigo and Miyamoto, the Office Action asserts that a person of ordinary skill in the art (POSITA) would consider it obvious to combine the teachings therein because “a super Gaussian filter with order  $m > 1$ , gives a high suppression ratio for cross-talk.” (See the Office Action, mailed March 1, 2007, page 5). The alleged reason merely repeats the advantages of the super Gaussian filter. However, Bigo and Miyamoto do not provide the motivation to perform the proposed combination of Bigo’s and Miyamoto’s teachings. In other words, an attempt to bring in the isolated teaching of Miyamoto into Bigo’s system would amount to improperly (in hindsight) picking and choosing features from different references.<sup>1</sup>

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<sup>1</sup> See In re Ehrreich 590 F2d 902, 200 USPQ 504 (CCPA, 1979) (stating that patentability must be addressed “in terms of what would have been obvious to one of ordinary skill in the art at the time the invention was made in view

While the required evidence of motivation to combine need not come from the applied references themselves, the evidence must come from *somewhere* within the record.<sup>2</sup> In this case, the record fails to support the proposed combination of Bigo's and Miyamoto's teachings.

Claims 3-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo and Miyamoto as applied to claims 1 and 17 above, and further in view of U.S. Patent No. 6,496,297 B1 to Frankel et al. ("Frankel").

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo and Miyamoto as applied to claims 1 and 17 above, and further in view of "Optical Networks", second Edition by Ramaswami et al., Academic Press, 2002, Published 12 October 2001, pp. 139-143 ("Ramaswami").

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo, Miyamoto and Frankel as applied to claims 3-12 above, and further in view of Ramaswami. Applicants respectfully note that claim 14 depends upon claim 1 and not claims 3-12.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo, Miyamoto and Frankel as applied to claims 3-12 above, and further in view of U.S. Patent Application Publication No. 2002/0025111 to Koshi ("Koshi"). Applicants respectfully note that claim 15 depends upon claim 1 and not claims 3-12.

Claims 16 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo and Miyamoto as applied to claims 1 and 17 above, and further in view of U.S. Patent No. 6,690,886 B1 to Guy ("Guy").

Claims 3-16 depending upon claim 1 are patentable at least by inheriting patentable features from claim 1, but also by reciting additional patentable features. The references cited in rejecting dependent claims 3-16 (Frankel, Ramaswami, Koshi, Guy, and Silberberg) do not correct or compensate for Bigo's failure to provide an enabling disclosure of a system having the features recited in claim 1. Additionally, the Office Action fails to put forth proper motivations for combining the references. For example, the phrase "as an engineering design choice" repeated on Page 7, line 3, line 14, lines 18-19, Page 8 lines 11-12, and line 15, does not provide a

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of the sum of all the relevant teachings in the art, not in view of first one and then another of the isolated teachings in the art," and that one "must consider the entirety of the disclosure made by the references, and avoid combining them indiscriminately.")

<sup>2</sup> In re Lee, 277 F.3d 1338, 1343-4, 61 USPQ2d 1430 (Fed. Cir. 2002) ("The factual inquiry whether to combine references ... must be based on objective evidence of record. ... [The] factual question of motivation ... cannot be resolved on subjective belief and unknown authority. ... Thus, the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion").

motivation, but merely states a *status quo*.

Independent claim 17 is patentable at least by reciting

wherein when it is assumed that the equation model expressing the transmission characteristics of said optical multiplexer and said optical demultiplexer is expressed by the following equation in which the shape of each transmission band  $T(f)$  corresponding to the wavelength of each signal light is expressed by using a frequency  $f$ , the center frequency  $f_c$  of the transmission band, full width at half maximum  $\Delta f$  of the transmission band, and a filter order "n",

$$T(f) = 10 \cdot \log \left[ \exp \left\{ -2 \cdot \ln \sqrt{2} \cdot \left( \frac{|f - f_c|}{\Delta f/2} \right)^{2n} \right\} \right] \quad (\text{dB})$$

spectrum efficiency at which the product of a transmission distance and a transmission capacity becomes a maximum value is calculated based on the assumed equation model, and

wherein a bit rate and frequency spacing of the signal light are set so as to approach the spectrum efficiency at which the product of said transmission distance and said transmission capacity becomes the maximum value, and also actual transmission characteristics at the time of multiplexing and demultiplexing the signal light is set in accordance with said equation model, to transmit the wavelength division multiplexed signal light.

Claims 18, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bigo and Miyamoto as applied to claims 1 and 17 above, and further in view of U.S. Patent 7,035,484 B2 to Silberberg et al. ("Silberberg").

The rejection of independent claims 18, 20, 22 and 25 is improper since the claims do not depend upon claim 1 and 17. Thereby, the office Action fails to provide a *prima facie* case of obviousness relative to these independent claims.

## CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

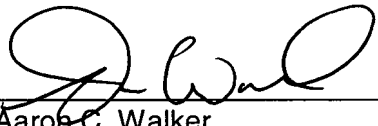
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If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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